CLAIMS

1. A fuel cell including a higher temperature zone that is subjected to a high temperature and a lower temperature zone that is subjected to a lower temperature than the higher temperature zone, said fuel cell comprising:

a plane of an electrolyte layer that has proton conductivity; and

a hydrogen permeable metal layer that is formed on the electrolyte layer and includes a hydrogen permeable metal, wherein the hydrogen permeable metal layer further includes a lower temperature area corresponding to the lower temperature zone and a higher temperature area corresponding to the higher temperature zone, and the lower temperature area and the higher temperature area have different settings of either or both of composition and layout of components.

2. A fuel cell in accordance with claim 1, wherein the hydrogen permeable metal layer has multiple layers of different hydrogen permeable metals in at least the lower temperature area, and

the different settings of either or both of the composition and the layout of components in the lower temperature area and the higher temperature area prevent potential deterioration of cell performance due to diffusion of the different hydrogen permeable metals between adjoining layers more actively in the higher temperature area than in the lower temperature area.

3. A fuel cell in accordance with claim 1, wherein the higher temperature area is set to have a lower level of hydrogen permeation, compared with the lower temperature area.

4. A fuel cell in accordance with claim 3, wherein the hydrogen permeable metal layer has a base material layer that is made of a group 5 metal or a group 5 metal-containing alloy, and a coat layer that is made of palladium or a palladium alloy and is formed on at least one face of the base material layer with a gas supply, and

the higher temperature area has a lower content of the group 5 metal in the base material layer, compared with the lower temperature area.

5. A fuel cell in accordance with either one of claims 2 and 3, wherein the hydrogen permeable metal layer has a base material layer that is made of a group 5 metal or a group 5 metal-containing alloy, a coat layer that is made of palladium or a palladium alloy and is formed on at least one face of the base material layer with a gas supply, and a diffusion control layer that is placed between the base material layer and the coat layer in at least the higher temperature area to control diffusion of the different metals, and

the diffusion control layer is designed to inhibit metal diffusion more actively in the higher temperature area than in the lower temperature area.

6. A fuel cell in accordance with either one of claims 2 and 3, wherein the higher temperature area is homogeneously made of palladium or a palladium alloy, and

the lower temperature area has a base material layer that is made of a group 5 metal or a group 5 metal-containing alloy, and a coat layer that is made of palladium or a palladium alloy and is formed on at least one face of the base material layer with a gas supply.

7. A fuel cell in accordance with either one of claims 2 and 3, wherein the hydrogen permeable metal layer has a base material layer that is made of a group 5 metal or a group 5 metal-containing alloy, and a coat layer that is made of palladium or a palladium alloy and is formed on at least one face of the base material layer with a gas supply, and

the coat layer in the higher temperature area has a greater thickness than a thickness of the coat layer in the lower temperature area.

8. A fuel cell in accordance with claim 1, wherein the different settings of either or both of the composition and the layout of components in the lower temperature area and the higher temperature area inhibit hydrogen embrittlement under a low temperature condition more actively in the lower temperature area than in the higher temperature area.

9. A fuel cell in accordance with claim 8, wherein at least the lower temperature area is made of an alloy containing a hydrogen permeable metal and has a lower content of the hydrogen permeable metal than a content of the hydrogen permeable metal in the higher temperature area.

10. A fuel cell in accordance with any one of claims 1 through 9, wherein the higher temperature area and the lower temperature area are formed on an identical plane of the hydrogen permeable metal layer included in said fuel cell as a unit cell of a fuel cell stack.

11. A fuel cell in accordance with claim 10, said fuel cell further comprising:

a coolant flow path through which a coolant passes,

wherein the lower temperature area is provided in a region near to an inlet of the coolant into the unit cell, on the identical plane of the hydrogen permeable metal layer.

12. A fuel cell in accordance with claim 10, wherein the lower temperature area is provided in a region near to an inlet of a low temperature fluid having a temperature difference of at least a preset level from an average operating temperature of the fuel cell stack, on the identical plane of the hydrogen permeable metal layer.

13. A fuel cell in accordance with any one of claims 1 through 9, wherein a number of said fuel cells as unit cells are laminated to form a fuel cell stack, and

the hydrogen permeable metal layer included in each unit cell of the fuel cell stack has the higher temperature area and the lower temperature area according to a total temperature distribution of the whole fuel cell stack.

14. A fuel cell in accordance with any one of claims 10 through 13, wherein the hydrogen permeable metal layer has the lower temperature area provided at a position corresponding to an outer periphery of the fuel cell stack.